MHF4U NAME:_____

Unit 3 ASSIGNMENT

Knowledge /Understanding

Multiple Choice *Identify the choice that best completes the statement or answers the question.*

____ 1. What is the domain of the reciprocal function of $f(x) = 5x + 1$?

a. $\{x \in \mathbf{R} \mid x \geq -\frac{1}{5}\}$ b. $\{x \in \mathbf{R} \mid x \leq -\frac{1}{5}\}$ c. $\{x \in \mathbf{R} \mid x \neq -\frac{1}{5}\}$ d. $\{x \in \mathbf{R}\}$

____ 2. Identify any holes in the graph of $f(x) = \frac{x+7}{7x+49}$

a. $x = \frac{1}{7}$ b. $x = -\frac{1}{7}$ c. $x = 7$ d. $x = -7$

____ 3. Identify the vertical and horizontal asymptotes of $f(x) = \frac{x-4}{2x+1}$.

a. vertical:$x = 4$, horizontal: $y = -\frac{1}{2}$

b. vertical: $x = 4$, horizontal: $y = \frac{1}{2}$

c. vertical: $x = -\frac{1}{2}$, horizontal: $y = \frac{1}{2}$

d. vertical: $x = \frac{1}{2}$, horizontal: $y = -\frac{1}{2}$

4. Find any x-intercepts of $f(x) = \frac{18}{3x+2}$. Explain how you found your answer. (1 mark)

5. Find any vertical asymptotes of $f(x) = \frac{x^2 - 25}{x^2 + 4x - 5}$ (1 mark)

6 Solve $\frac{x+4}{x+3} = \frac{x+1}{x+2}$ for x. (3 marks)

7. Solve $\frac{7}{3} = \frac{5}{x} + 4$ for x. (3 marks)

8. Find all values that make the inequality $\frac{x+4}{x-3} \geq \frac{x-5}{x+2}$ true and write your answer in interval notation. (5 marks)

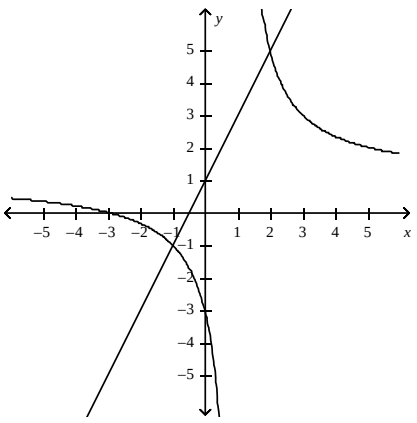
9. For $f(x) = \frac{x-6}{x+5}$, find the average rate of change from $-4 \leq x \leq -1$. (3 marks)

Application

____ 1. State the equation of $f(x)$ if the vertical asymptote is $x = 3$, the horizontal asymptote is $y = 1$, the x-intercept is (0, 0) and the y-intercept is (0, 0).

a. $f(x) = \frac{x}{x-3}$ b. $f(x) = \frac{x}{x+3}$ c. $f(x) = \frac{x-3}{x}$ d. $f(x) = \frac{x+3}{x}$

____ 2. Use this graph to determine which of the following is a part of the solution set of $2x+1 > \frac{x+3}{x-1}$.



a. $x < -1$ c. $x \geq 2$
b. $-1 < x < 2$ d. $x > 2$

3. Members of a high school choir want to attend a national contest. After a sign-up, the choir director stated that the trip will cost $400 per choir member plus a $1500 fee for the choir to participate.
   a) Write an equation to represent the total average cost of the trip per choir member. (1 mark)

   b) What is the horizontal asymptote of the function? What does it mean in relationship to this problem? What is the vertical asymptote? What does it mean in relationship to the problem. (2 marks)

   c) Find the total average cost of the trip if 45 members attended. (1 mark)

   d) How many members must attend to bring the total average cost to $425 per member. (2 marks)

TIPS

1. State the equation of a rational function in the form of $f(x) = \frac{ax+b}{cx+d}$ if the vertical asymptote is $x = 5$, the horizontal asymptote is $y = 2$, the x-intercept is $(-\frac{1}{2}, 0)$ and the y-intercept is $(0, -\frac{1}{5})$. (2 marks)

2. Write a rational equation that **cannot** have 3 or -5 as solutions. (1 mark)

3. Why can you **not** approximate the instantaneous rate of change of $f(x) = \frac{3x^2+13x-10}{x^2+6x+5}$ for $-6 < x < -3$?(2 marks)

4. Find **the equation of the tangent line** to $f(x) = \frac{2x}{x+1}$ at (1, 1). (3 marks)

5. The Football Boosters bought pizza for $900 to sell at the game. They kept 10 pizzas to feed the players after the game and sold the rest for $1040. There were 8 slices in each pizza. Their profit was 50 cents a slice.
   a) How many pizzas were in the original order? (3 marks)

   b) What was the original price of each pizza? (1 mark)

   c) What did they charge per slice? (1 mark)

   d) If they bought plain cheese pizza, the original price would be $10 per pizza. What would this make their profit be per slice if they sold it for the same price as before and still saved 10 pizzas for the players? (2 marks)

Communication

1. Describe a method for identifying each of these characteristics for f(x) if f(x) is a rational function.

   a) *x*-intercepts

   b) *y*-intercepts

   c) vertical asymptotes

   d) horizontal asymptotes

   e) holes in the graph

   f) intervals where $f(x)$ is positive or negative

   g) Describe $f(x)$ if the horizontal asymptote is $y = 0$.